

SCIENCE

FRIDAY, OCTOBER 19, 1888.

IN THE *Contemporary Review* for July is an interesting article by Frances Power Cobbe on 'The Scientific Spirit of the Age,' one portion of which, at least, expresses our own views on the subject, and we presume that of others. She says, "The political press has adopted the practice of reporting the details of illness of every eminent man who falls into the hands of the doctors, and affords these gentlemen an opportunity of advertising themselves as his advisers. The last recollection which the present generation will retain of many an illustrious statesman, poet, or soldier will not be that he died like a hero or saint, bravely and piously, but that he swallowed such and such a medicine, and perhaps was sick in his stomach. Death-beds are desecrated that doctors may be puffed and public inquisitiveness assuaged." We believe, however, that the "political press" is more to blame for this than the "doctors." While it is true that some of these seize with avidity every such opportunity to bring themselves into notoriety, yet there are others (and these we believe are in the majority) who shrink from the publication of their opinions, and would oftentimes prefer to relinquish the case rather than to be brought forward so prominently before the public. It was a matter of deep chagrin to the late Prof. Frank Hamilton that his name figured so often in the public press while he was in attendance upon President Garfield during his fatal illness. The position of a physician who is in attendance upon an illustrious personage is a most trying one. The public demands professional opinions; and, whether the physician communicates them to the representatives of the press or withholds them, he is equally condemned. Miss Cobbe would place the medical profession under great obligations if she would indicate just what course its members should follow under these circumstances.

AT THE LAST MEETING of the New York Academy of Sciences, Dr. A. Julien and Prof. H. C. Bolton gave a report of the interesting results of their long-continued researches on sonorous sands. The cause of this remarkable phenomenon, which was first known to occur in Arabia, has long been a mystery. In course of time many other localities in which sonorous sands occur became known, and, in fact, it may be found almost everywhere on beaches and in deserts. The authors collected samples from all parts of the world, and, on close examination, found that all sonorous sands are clean; that no dust or silt is found mixed with the sand; that the diameter of the angular or rounded grains ranges between 0.3 and 0.5 of a millimetre; and that the material may be siliceous, calcareous, or any other, provided its specific gravity is not very great. When these sands are moistened by rain or by the rising tide, and the moisture is evaporated, a film of condensed air is formed on the surface of each grain, which acts as an elastic cushion, and enables the sand to vibrate when disturbed. In sands mixed with silt or dust, these small particles prevent the formation of a continuous air-cushion, and therefore such sands are not sonorous. If this theory be correct, sonorous sand must become mute by removing the film of air. Experiments of the authors prove that by heating, rubbing, and shaking, the sand is 'killed.' All these operations tend to destroy the film of air condensed on the surfaces. On the other hand, samples of sonorous sand were exhibited which had been kept undisturbed for many years. They had retained their sonorousness, but, after having been rubbed for some time, became almost mute. The theory advanced by the authors appears very plausible, and will be

firmly established when they succeed in making a sonorous sand. Their experiments in this line have not yet been completed, but promise fair success.

MEDICAL LEGISLATION IN NEW YORK.

IT is more than probable that additional legislation will be sought from the next Legislature of New York to control the practice of medicine. Mr. W. A. Purrington, counsel for the Medical Societies of New York County and State, recently read a paper before the American Social Science Association on the extent to which legislation can aid medical education. Legislators will do well to study this paper before introducing any new laws pertaining to the subject. Mr. Purrington thinks that a responsible board should be created, that will have in charge the arrangements of quarantine and sanitation, and also the licensing of medical practitioners of every sort; for he contends that the dentist and the pharmacist should be recognized as medical men. All that legislation can do to aid medical education he believes can be summed up as follows:—

I. By fixing a minimum age under which they (physicians, dentists, and pharmacists) will not be allowed to practise their calling.

II. By requiring of each of them a fixed term of study of certainly not less than two graded years, leaving to the board the care of details.

III. By requiring proof by examination or certificate that each candidate for license had studied, before beginning his professional course, at least those branches in which law students are examined in this State before they commence their legal studies.

IV. By declaring that no medical schools (including in the term schools of dentistry, pharmacy, and midwifery) shall be incorporated by special act, and providing a general law for the incorporation of such schools, only upon proof made of the possession by the incorporators of sufficient capital—say, not less than a hundred thousand dollars—and a teaching plant, to justify the belief that the school will be capable of exercising faithfully its franchise. Such an act should contain stringent provisions for its own enforcement and for the forfeiture of abused charters.

V. A minimum course of medical study should be prescribed, in which a grade of at least seventy per cent should be attained on examination. The regulation of all details of the examination should be left to the board. But the topics in which the examination should be had might well be specified in the statute. It might be well to omit the topics of therapeutics and materia medica, upon which all medical heresies have been begotten by unscientific minds, inferring that one who should creditably pass his examinations in botany, chemistry, physics, anatomy, surgery, physiology, hygiene, diagnosis, obstetrics, and microscopy, especially if his clinical examination should show him to be educated in a true sense to observe and draw sound deductions from observation, might be trusted to form his own conclusions and pursue his own studies as judgment should dictate in the field of therapeutics. The law can have nothing to do with medical theories. The utmost it can do successfully is to prescribe that none shall practise medicine except persons educated in those branches of science that all admit are essential to an understanding of morbid conditions of our species, and possessed besides of a fair general education.

VI. Finally, the law should not recognize any diploma as of itself conferring a right to practise medicine: even if the possession of such document should be required as an antecedent to examination by the health board, it should not be allowed to take the place of such an examination. Any scheme of medical legislation will hereafter embrace that great safeguard against imposture and efficient tracer of frauds, the system of registration, where no one is allowed to practise medicine who has not made a public record, under oath, of his name, origin, and credentials for a license.

A RUSSIAN PACIFIC RAILROAD.

THE question of a rail connection of the Baltic with the Pacific Ocean through Russia and Siberia has frequently been discussed, and recently steps have been taken to carry out part of this great enterprise. Political as well as economic reasons make the establishment of a better connection between Siberia and Russia appear very desirable. The remoteness of the Amur Province from the mother-country makes the security of this possession appear doubtful, and the immense distance of Siberia from any market renders its produce almost valueless.

The experience of American railroads shows that there is no better means of developing the productive capacity of a country than by the establishment of railroads. Siberia is capable of becoming a highly productive country, and the limits of its productiveness can hardly be conceived. The history of the settlement of the American and Canadian North-West Territories shows that an excessively continental climate is not a serious drawback to the development of a country. Southern Siberia has great agricultural resources; large tracts of land are well adapted for stock-raising; and its forests and mineral resources are of great value. While precious metals yield even now a considerable income, its rich coal and iron deposits have hardly been explored. The abundant supply of furs and fish needs only to be mentioned. At present a large portion of the grain grown in this country is used for distilling alcohol, as there is no market for it.

The only thing needed is better means of communication. The large rivers of Siberia, which flow into the Arctic Ocean, are not available for this purpose, as their mouths cannot be reached regularly from Europe, and as they are frozen during the greater part of the year. Numerous attempts have been made to ascertain the feasibility of a regular intercourse between the Atlantic ports and the mouths of the Siberian rivers; and, from the experience of Captain Wiggins, it would seem that the route is not so impracticable as it appeared to be. He succeeded eleven times in making the journey from England to the mouth of the Yenissei, and up to Krasnoyarsk, and proved that this trade may become of some importance, although the difficulties are so formidable that only the remoteness of central Siberia makes its use practicable. Another project of making the great rivers of Siberia more useful is that of a railroad from the Obi to a point west of the Strait of Kara. Although this plan might help to develop to a certain extent the resources of western Siberia, it would hardly prove adequate to opening the most productive parts of this vast country.

In summer the rivers afford a good means of intercourse, and plans have been made to improve them. The most important of them is the connection of the Obi and Yenissei by means of a canal, work on which is in progress. When this canal is completed, the following line will be open to commerce,—from Tyumen, the terminus of the Perm-Tyumen Railroad, down to Tobolsk,—and, following the Irtysh, vessels will reach the Obi at Samarsk. From here they will ascend the latter to the point where it approaches nearest to the Yenissei. Following the canal, they will reach the Yenissei, which is descended down to the confluence of the Upper Tunguska, which comes from Lake Baikal. In East Siberia the Amur affords good means of communication. The route follows the Chilka, and its tributary the Ingoda, as far as Chita. The distance between this point and Lake Baikal is not very long.

It seems that it has been decided to build first those portions of the Pacific Railroad which will supplement those sections which are open to river-navigation. This requires the building of the sections from Vladivostok to the mouth of the Usuri, from Chita to the Selenga, and from Irkutsk to Tomsk. The last is necessary, as the Upper Tunguska would require very expensive regulation. Should these works be completed, and reasonably fast-going steamers be put upon the rivers, the development of Siberia will receive a strong stimulus.

The effect of this improved inland connection upon the development of manufactures and industries will be great. At present eighty per cent of the total manufactures of Siberia belong to the territories Tobolsk and Tomsk. According to the reports of the Bureau of Statistics, there are 2,300 factories, which employ 12,500 men, and produce 14,000,000 rubles' worth of goods annually. The principal manufactures are those which use raw animal material:

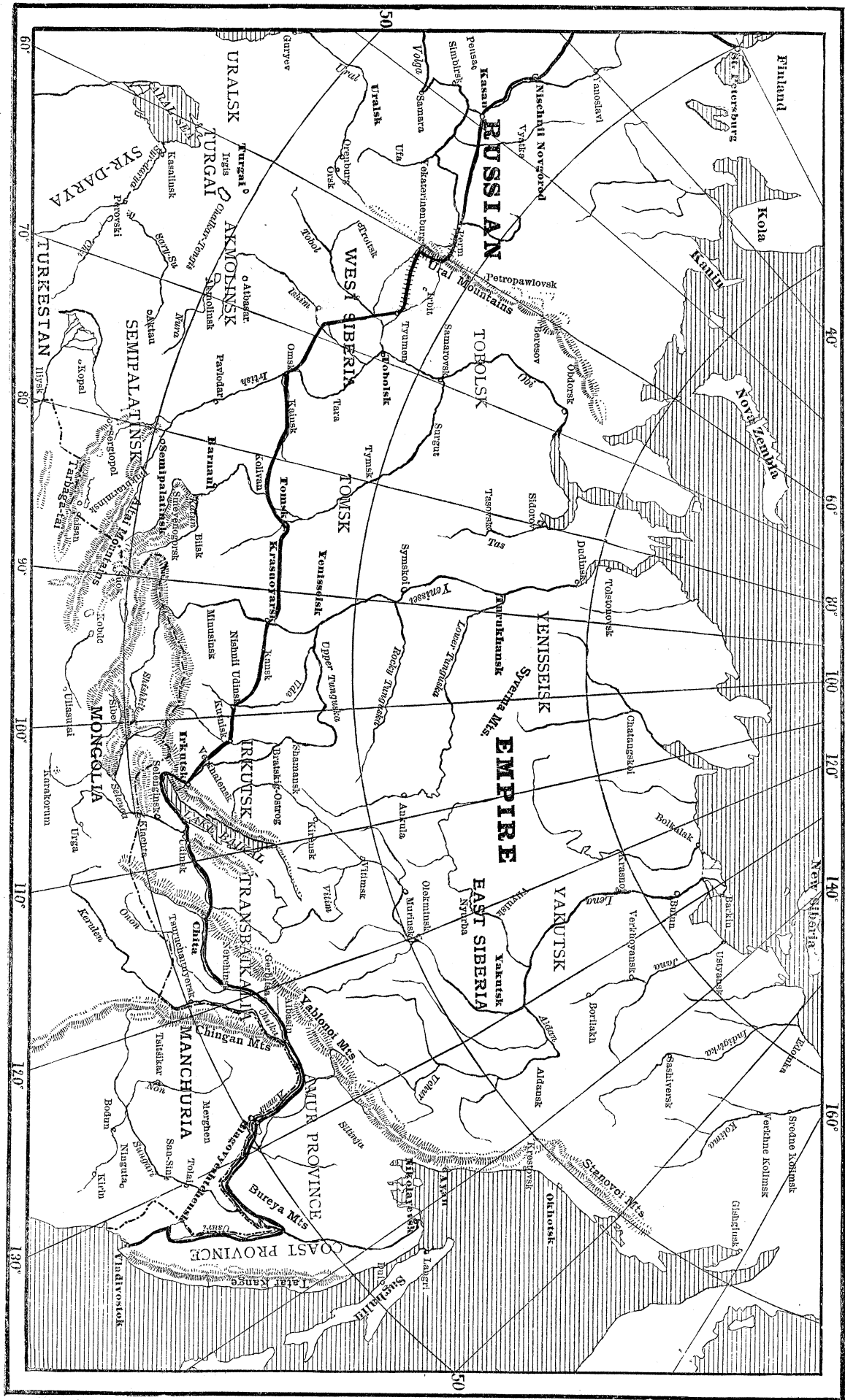
500 tanneries produce goods valued at 3,000,000 rubles, and 150 tallow-factories have an annual output of 2,000,000 rubles in value. Next in importance are manufactures based on raw vegetable material. The rich mineral deposits of Siberia are not yet opened to any great extent. The industrial development of this region does not date back farther than about fifteen years. It was only then that modern machinery was introduced; and the subsequent improvement in the quality of Siberian manufactures has secured for them an extensive sale in Asia. The slow progress of these manufactures will be greatly accelerated as soon as cheaper and more rapid communication with Europe has become possible.

One of the principal considerations which recommend the construction of the Siberian Pacific Railroad is the remoteness and isolation of the Amur and Coast Provinces. At present there exist hardly any roads in this region. Communication is possible only on rivers which are navigable in spring and autumn, while in summer and winter intercourse is interrupted. In winter, sledges are used for travelling, while it is impossible to transport freight. What little trade there is, is almost exclusively in the hands of Americans and Chinese. The whole Russian population of Transbaikalia, the Amur Province, and the Coast Province, amounts at present to twenty thousand, while immigration from Manchuria is of considerable importance; therefore the Russian Government attempts to promote the Russian colonization of this region. The country is rich, but it is too remote to become a Russian colony until better communication with Transbaikalia has been established.

It must not be expected, that, even after the completion of the road, the settlement of Siberia will make as rapid strides as that of the American North-West. It is true, the Russian peasant is inclined to leave his home, and to look for a more prosperous life east of the Ural; but it must be remembered that no foreign immigration is possible, or would be allowed, the political aims of the Russian Empire being to Russianize the whole of its territory. As European Russia is not very populous compared to its area, a Siberian emigration will retard its progress in many respects, as its effect will be to produce a lack of the workers necessary to develop its resources.

The proposed railway, if completed, will be of importance not only for the development of the resources of Siberia, but also for the Eastern trade. At present a considerable amount of Chinese goods, among which tea is the most important, is sent overland. The cost of transportation is, of course, enormous, and will be greatly cheapened by the railroad. The present state of this trade may be seen from the following data given by the commissioner of Chinese customs at Tientsin. In 1887 this trade increased by 5,400,000 pounds, or nearly half as much again as in the year before; while the quantity of brick tea carried by the same route increased 7,300,000 pounds. This remarkable growth of the overland tea-trade was due to the unusual luxuriance of the Mongolian pastures, which, providing as they do the only sustenance for the enormous herds of dromedaries almost exclusively used as beasts of burden in these regions, exercise a very great influence on the prosperity of this branch of trade. It was owing to the failure of the grass-crop in 1885 that the transport of tea by that route fell so low, great numbers of dromedaries having died of starvation. The uncertainty of the grass-supply, and consequently of the means of transport, has led some Russian merchants to project a Decanville portable railway across the plains of Mongolia from Kalgan to Urga. The motive power would still be supplied by camels; but, whereas fifty thousand of these animals are now employed, it is calculated that ten thousand only would be required to do the same work on the railway, and that with these increased facilities the trade would in all probability be doubled. As in case of failure of the grass-supply a sufficient quantity could easily be brought from Siberia by the returning trains, the additional advantage would be gained of more certainty in the means of transport. The carriage of the tea over the mountainous district between Urga and Kiachta would still be effected by camels. An alternative scheme is a railway from Stretinsk to Veringukunsk, on the Amur. A fleet of seventy steamers is running on the Amur, and goods can be conveyed from Veringukunsk to Kiachta by one of the affluents of the Selenga River. Russian steamers would convey the tea from Hankow to the Amur. This route would be entirely under the control of Russia. It would

SKETCH-MAP OF THE RUSSIAN PACIFIC RAILROAD.



bring the whole profits of the trade into Russian hands, and offer greater financial facilities.

This route, although more expensive than the transport by sea through the Suez Canal, is preferred, as the quality of the tea thus transported is better.

One of the important considerations which induce the Russians to urge the building of the Pacific road is purely political. The Chinese boundary is at present almost unprotected, and it would be extremely difficult to concentrate an army of considerable strength anywhere east of Semipalatinsk. It is true that the boundary as far east as Manchuria is guarded by the best of protections, — a vast desert. Still greater weight is attributed to the connection with Vladivostok, the only harbor Russia possesses on the open ocean. Without the railroad, Vladivostok is of very little value, as the Coast Province is not able to furnish provisions for the garrison and fleet. It is hoped that its value will be greatly enhanced by the construction of the railway. A glance at the map will show that the latter follows for a long distance the boundary: therefore, in case of war with China, its safety appears very doubtful, and, indeed, it has been proposed by military authorities that it would be more advisable to build the road farther north.

From an engineering point of view, there are no serious obstacles to the building of the road, except the bridging of the large rivers of West Siberia, and the passing of the enormous swamps of that region, which would probably make the road far more costly than the Transcaspian Railway. There are no steep grades that would present serious difficulties.

The distances of the several sections of the line are given as follows:—

	Miles.
Tyumen to Tomsk.....	800
Tomsk to Irkutsk.....	1,050
Irkutsk to Stryelka.....	800
Stryelka to Usuri.....	1,000
Usuri to Vladivostok.....	300
Total.....	3,950

The cost of construction is estimated at from five to seven hundred million rubles. The whole distance from St. Petersburg to Vladivostok is estimated at six thousand miles; and the time necessary for accomplishing this distance, at from sixteen to seventeen days. To this must be added a few days for the journey from Japan and China to Vladivostok, and from St. Petersburg to western Europe. Thus the journey from eastern Asia to Europe might be made in from twenty to twenty-two days instead of from thirty to thirty-five days, which it takes steamers to run from China to England.

It seems improbable that the effect of this road upon the trade of the world will be as important as that of the American Pacific roads. The political condition of Siberia is not favorable to an energetic development of its resources and to an extensive immigration; and, the length of the road being so great, it is doubtful whether it would be able to divert the carrying-trade to any great extent from the steamers using the Suez Canal route.

SCIENTIFIC NEWS IN WASHINGTON.

Do Solids act Chemically upon Each Other? Mr. Spring's Experiments do not prove it. — The Transit of Venus and the Solar Parallax. — An Eighth Sternum Rib. — Measurements of Crania. — Adulteration of Condiments. — A New Fibre from the Stalk of the Cotton-Plant.

Chemical Action between Solids.

ONE of the most interesting papers read before the Washington Philosophical Society last spring was one by Mr. William Hallock on the formation of alloys at lower temperatures than the melting-points of either of their constituents. An abstract of the paper was published in *Science* (xi. No. 265) at the time. Mr. Spring, a distinguished chemist of Belgium, has been pursuing researches in the same field as Mr. Hallock, and has criticised some of the latter's work. At the last meeting of the Philosophical Society Mr. Hallock turned the tables on Mr. Spring by examining some experiments, a description of which had been published, to prove that chemical action takes place between solids.

Mr. Hallock began by mentioning one or two experiments illustrative of his theory of the formation of alloys, as referred to above. He placed potassium and sodium in contact, arranging a thermometer to register the temperature. As they united, the temperature fell 2°.4 C. below that of the room. A block of ice and one of rock-salt, the temperature of each being reduced 10° or 12° C. below the melting-point of the ice, when brought into contact, began immediately the formation of the solution of salt.

One of Mr. Spring's experiments to show chemical action between solids consisted of placing copper filings and sulphur in contact. The sulphur attacked the copper. Mr. Hallock doubted that this was a case of chemical action between solids, and prepared the following described experiment to satisfy himself. A piece of bright copper and a small mass of sulphur were placed near, but not in contact with each other. After a time the face of the copper was blackened by the sulphur. Thinking it barely possible that particles of copper might fly across the space between them, Mr. Hallock then varied the experiment as follows: The copper and sulphur were placed in a glass tube, with a wad of absorbent cotton an inch thick between them. The experiment was varied in several ways, in one case the tube being filled with dry air, in another the air exhausted, and in a third the tube being filled with oxygen, etc. In every case the copper was affected by the sulphur, although in some more than in others. Mr. Hallock's conclusion was that the chemical action did not take place between the copper and the sulphur *as a solid*, but that the active agent was the vapor of sulphur. In the same manner re-action took place between copper and mercuric chloride, the vapor of the latter passing through absorbent cotton.

Mr. Hallock does not deny that chemical action may take place between solids, — indeed, he is inclined to think that it does, — but he holds that Mr. Spring's experiments do not prove it.

The Solar Parallax.

Prof. William Harkness, a member of the United States commission to observe the transit of Venus, in a long paper read before the Philosophical Society at its last meeting, gave a very interesting description of the instruments used in observing the transit and in photographing the sun. Great labor, much of it very perplexing and occupying many weeks, was required to measure lenses used, and determine their focal distances, to ascertain the peculiarities of mirrors, etc., as preliminary to the observations. Professor Harkness described this work. About sixteen hundred photographs were secured, most of which have already been finished. The methods of reduction were also explained.

In the latter part of his paper, Professor Harkness spoke of the solar parallax and its related constants, introducing a series of intricate calculations which he has made to determine the latter. Among them may be mentioned the sun's distance from the earth as found by his calculations, 92,385,000 miles; as computed from data furnished by the transit of Venus, 92,521,000 miles; the moon's distance from the earth, 238,852.4 miles; the moon's mass, $\frac{1}{81.5}$; the velocity of light, 186,298.4 miles per second; sun's parallax, $8867'' \pm .0012''$.

An Eighth Sternum Rib.

At one of the meetings of the Anatomical Society during the late Medical Congress in Washington, Dr. Lamb of the Army Medical Museum spoke briefly of a singular phenomenon he had observed in his examination of human breast-bones. It was the occurrence, in a number of specimens, of an eighth rib, the cartilage that is usually found below the seventh rib being fully developed into a rib. Dr. Lamb first saw a specimen of this kind about ten years ago. While teaching, he had occasion to observe the subject he had before the class with great care, and was surprised on one occasion, on counting the ribs, to find that there were eight. He made no further investigation at the time, presuming that the phenomenon might be of comparatively frequent occurrence.

More recently Dr. Lamb has given the subject more attention, and now has in his own collection four specimens, while in the Army Medical Museum there are eight more. In all these cases the phenomenon occurs in negroes, but one additional specimen is that of an Indian.

Dr. Lamb has made a thorough search of anatomical literature

for references to the peculiarity mentioned. In the English books there is only a single incidental reference to it, and in that case the author does not say that he has ever seen a specimen. In German books there are two references, one of them being the one already mentioned by the English authority. The French anatomists do not mention it at all; and only one American, Allen, makes any reference to it. Among the anatomists attending the Medical Congress only two or three had seen specimens.

Dr. Billings, in a circular he has sent out to anatomists and others, has requested that information on the subject be sent to the Army Medical Museum.

The ethnological importance of Dr. Lamb's discovery has not yet been determined. If the eighth rib is found to occur more frequently in one race than in others, as the Washington specimens seem to point to the negro, the students of comparative anatomy may yet draw interesting deductions from that fact.

Measurements of Crania.

Under the direction of Dr. Matthews and Mr. Tracey, of the Army Medical Museum, a series of measurements of skulls is being made. About one hundred skulls, representing different nationalities, were selected from the three thousand which constitute the museum's collection, and a series of sixty linear measurements are made upon these in addition to measurements of certain angles and the ascertainment of the capacity of each skull. These measurements are mostly made upon lines of former ones, in order to preserve a uniformity of data, although many of them are considered of little or no value. A few new measurements are made, which, it is believed, will prove important. The measurements, together with descriptions of the skulls, will be published as a part of the catalogue of the Army Medical Museum which is contemplated.

It is not expected that any important conclusions will be reached as a result of the work above described. No fact has been better established than that the size of the brain or the shape of the skull has nothing to do with the mental capacity of the person. The causes of difference of intelligence must be sought elsewhere. It is possible that the measurements, if carried far enough, may tend to the establishment of distinct types of crania, and aid in their classification.

The Army Medical Museum collection of crania is in many respects a very interesting one. The number of Eskimo skulls is the largest yet made, and the department is especially rich in other aboriginal American crania. A recent accession of Peruvian skulls contains some curious specimens, especially of deformities. These were generally caused by bandaging and the binding of boards to the head, and a great variety of shapes was produced. Nothing is known as to the significance of these deformities. Whether they were distinguishing marks of different ranks in society or of the special rank of the individual, or were simply a custom, is a mystery.

Adulteration of Condiments.

The microscopist of the Department of Agriculture, Prof. Thomas Taylor, has begun an examination of the condiments of commerce for the purpose of ascertaining which of them are adulterated, the methods and extent of the adulteration, and of discovering methods by which the consumer may detect impure articles.

The first article treated was pepper, and the method of the investigation is here briefly described. A section of a pepper-corn is placed under a microscope, and magnified one hundred and fifty diameters. Its appearance is carefully noted and photographed, and a drawing in colors is made, showing exactly how it looks. The pure powder of pepper-corns is then treated in the same way, and, from a comparison of the image of this with that of the section, the changes caused by grinding may be noted. The next step was to examine specimens of the pepper of commerce to ascertain if it presented the same appearance as the pure pepper already photographed and drawn. In a majority of cases it did not, the differences being so striking as to mark it as an entirely different article.

Professor Taylor has ascertained that the substance used in adulterating pepper is the seed or stone of the olive. These are obtained in large quantities from the olive-oil factories, and ground

up with the pepper-corns, the extent of the adulteration being in some cases as great as fifty per cent.

No method of popularly detecting adulteration of pepper has yet been found. In bulk the pure pepper is darker in color than that to which olive-seeds have been added; but the difference is so slight that no person, unless possessed of a sample to compare with, would be able to discover any difference.

A New Fibre from the Stalk of the Cotton-Plant.

A manufacturing firm in New York has sent to the Department of Agriculture specimens of a new fibre they are making from the stalk of the cotton-plant. The samples received strongly resemble hemp, and seem to be adapted to all the uses that hemp is put to. A few fibres of it twisted together in the hand show remarkable tensile strength, although no exact comparative tests with other fibres have yet been made. A collection of the fibres of hemp, flax, jute, ramie, etc., from all parts of the world is being made by the department, and a new instrument has been invented by which it is expected that the tensile strength of each will be ascertained with great accuracy.

If the cotton-plant turns out to furnish as valuable a fibre as now seems possible, an important new source of profit will be afforded the cotton-planters of the Southern States upon their crops.

HEALTH MATTERS.

Corrosive Sublimate as a Disinfectant.

AN exceedingly valuable contribution to the subject of disinfection has been made by Dr. W. B. Hills of Cambridge, Mass., in a paper presented by him to the Massachusetts Medical Society. His paper is entitled 'The Value of Corrosive Sublimate as a Practical Disinfectant.'

He criticises the work and report of the committee on disinfectants of the American Public Health Association, which, since its publication in 1885, has been the guide of most of the boards of health in the United States. He says of it, "An examination of the report of this committee fails, however, to bring to light the slightest particle of evidence upon which such a recommendation could have been based. The statements made relative to corrosive sublimate are very contradictory and confusing; the biological tests recorded are few in number and very unsatisfactory; and the report, as a whole, shows evidence of hasty preparation, and is not at all creditable to the committee."

He reviews that portion of the committee's report which treats of corrosive sublimate and its action, and puts the committee on its defence. He does not deal in generalities which cannot be met, but particularizes in such a manner, that, if wrong, his mistakes can and should be pointed out; while if, on the other hand, he is correct, his conclusion should be accepted, and those of the committee should be changed to be in accord therewith. The general result of his observations and experiments is summed up in the following paragraphs:—

"Corrosive sublimate, in a word, though a very efficient disinfectant as measured by its power to destroy germs, is limited in its applications. It can be used for the disinfection of furniture and other articles made of wood or porcelain, or even metal, if varnished, the floors and walls of rooms, such parts of ships as can be reached with solutions, the hands and the surface of the body, and clothing and bed-linen if not soiled with discharges; in other words, for the disinfection of surfaces which are not themselves injured by contact with it, or surfaces which do not contain material of such a character as to destroy its efficiency. Its use for these purposes is, however, very much restricted, because we have no means of disposing of it, except through lead pipes.

"Objections have been made to it because of its poisonous character. The danger of poisoning, however, is very slight. The solutions employed are very dilute, and its taste is sufficiently disagreeable to attract attention before an amount sufficient to do any injury has been taken. If the solutions are colored, the danger of mistakes is much lessened. The same objection may be made with equal reason against all substances which we now recognize as disinfectants. Care is necessary in the employment of all of them,

and those intrusted with their use should be informed of their properties, that all necessary precautions may be taken.

"There is, however, one process of disinfection with corrosive sublimate to which this objection may with some reason be made. I refer to its use for the disinfection of streets, for which purpose it has been employed by the Board of Health of Boston for the past two years or more. If its use for this purpose is continued, the time cannot be far distant when the beds of the streets will become saturated with various compounds of mercury. All of these, so far as we have any knowledge of them, are violent poisons. Is any danger to be apprehended from continually inhaling or swallowing, month after month, dust loaded with compounds of mercury? This is a question deserving serious consideration at the hands of the Board of Health. While not claiming that the process is positively a dangerous one, I believe it is one which involves some risks, and one which it is advisable, therefore, to discontinue."

DEPENDENT CHILDREN. — We commend to our readers a paper presented to the Prison Congress by Mr. C. H. Reeve of Plymouth, Ind., entitled 'Dependent Children.' He says, "The mass of dependent children is largely made up of foundlings, illegitimates, children abandoned by worthless parents, orphans of the very poor, with a few better born who become waifs from various causes. In the cases of nearly all of them except the last, there is more or less mental deficiency, or deformity in the brain substance, or the conformation or arrangement of brain ganglia. Statute law makes marriage a civil contract, — a matter of dollars and cents. No matter who comes for a marriage permit, — the strong or the weak-minded; the sound and healthy or the deformed and constitutionally diseased; the millionaire or the hereditary pauper; the moral and orderly, or the vicious and confirmed criminal; the progenitor of statesmen or of idiots; the sane, or the hereditary insane if favored with a lucid interval; the temperate or the besotted, — all are given a permit alike. The revenue is collected, the ceremony authorized, the record made, and this civil contract is fully completed by sanction of law. If a man wants to run a locomotive-engine, or practise medicine (elsewhere than in the United States), or plead in the courts, or stand in the sacred desk and talk theology, or teach a school, or run a pilot-boat, or even to secure a petty clerkship under government, he must submit to a rigid examination as to his fitness for the position and its duties, and be able to pass one. But one comes forward to get a permit to enter into a contract that places him under obligations, and demands of him duties, that are the most important, the most responsible, the most sacred, that can be assumed anywhere between the cradle and the grave, that vitally affect the bodies social and politic as well as corporal, now existing and hereafter to exist, directly and indirectly, not a word is said. All are licensed." In his paper he criticises the Church in the following language: "It regards marriage as a holy, sacramental covenant. By permission of law, its ministers ceremonially aid the parties in making this holy covenant, which at the same time involves the statutory civil contract. It makes little or no inquiry as to the candidates (one organization may as to belief in a creed). It looks only for a license, and the fee in prospect. Even in the shadow of the prison-wall and of the gallows, its ministers, in sacerdotal robes, have united criminals. Thus is it sanctioned by the Church!" He believes that human foresight and legal provisions can prevent these marriages.

BALDNESS. — We have from time to time given our readers the views held by the medical profession and the laity as to the causes of baldness. The view which has seemed to us as being the best supported by both facts and theory is that baldness is especially liable to follow the wearing of a tight-fitting hat, the band of which constricts the blood-vessels, and thus diminishes the blood-supply to the scalp. In the *Popular Science Monthly* is a communication from a writer who has spent a considerable time in India, which controverts this explanation of the cause of baldness. The Parsees are compelled to keep the head covered during the day by a high hat, which is so tight as to crease the scalp, and, the writer thinks, possibly the skull, and at night by a skull-cap. He has never seen or heard of one of them being bald.

TREATMENT OF YELLOW-FEVER. — Regarding the treatment of this disease, Dr. George M. Sternberg, U.S.A., in the *Therapeutic*

Gazette, Aug. 15, reports the favorable results obtained in a series of twelve cases treated on the alkaline plan. His recent researches in Havana have led him to think it very probable that in yellow-fever, as in cholera, the specific micro-organism causing the disease is located in the alimentary canal. While this is not proved, it is demonstrated, that, as a rule, no micro-organism capable of development in the culture-media usually employed by bacteriologists is present in the blood or tissues of those recently dead from yellow-fever. This view naturally suggests intestinal antisepsis as a mode of treatment. It is well known that in yellow-fever the urine and the vomited matters are highly acid. He has also found the intestinal contents to have usually a more or less decided acid re-action. A microbe, therefore, capable of multiplying in the stomach and intestine in this disease must be able to grow in an acid medium. But aside from this theoretical reason for prescribing alkalies, the highly acid condition of the secretions furnishes an indication for such a treatment, and the writer has long desired an opportunity to see a thorough trial of a decidedly alkaline treatment. These considerations induced him, during his recent visit to Havana, to propose a formula, which was adopted by Dr. Raphael Weiss, house physician at the Garcini Hospital, and he has just received from him a record of twelve cases treated by the director of the hospital, Dr. Francis Cabera, and himself. They all recovered, and he adds that every case so far treated at the Garcini by that method has recovered. While these twelve cases were being treated, and a little before, eight cases were treated in the same institution by other methods, and five of the eight died.

DIPHTHERIA CARRIED BY TURKEYS. — Some time ago we reported several cases of diphtheria which had been contracted from a turkey. The following case, which is taken from the *British Medical Journal*, is another contribution to this subject: "A fowl with diphtheria was brought to the house of a veterinary surgeon on April 24, and died on the 29th. The feeding and nursing of the bird devolved on a lad, aged fourteen, who was assisted by his brother, aged five. On the evening of May 11 the writer was called to see the little boy of five, who had been poorly for a day or two. He had enlarged cervical glands on the left side, which had come on rapidly. He was a delicate little fellow, with fair hair and anæmic aspect. The temperature was 103° F.; pulse, between 120 and 130. The fauces were more or less covered with diphtheritic membrane, the left tonsil more especially. Under the administration of biniodide of mercury and iron, the throat symptoms cleared up, and the child made a good recovery. On the day after this case was first seen, the boy who fed the fowl was very feverish, and had similar patches over his fauces, but not to the same extent as his brother. His throat was painted with boroglyceride. A sister, aged nine, had also a similar explosion on the fauces. Bark and acid and boroglyceride was the treatment. On the 18th the mother, who had nursed them, was attacked, and was similarly treated. They were all kept well up with beef-tea and stimulants."

CIGARETTE-SMOKING. — Dr. W. L. Dudley has been conducting some experiments with cigarettes in order to determine their effect upon smokers. His conclusions are, (1) that carbonic oxide is the most poisonous constituent of tobacco-smoke; (2) that more injury results from cigarette than cigar or pipe smoking, because, as a rule, the smoke of the former is inhaled; (3) that cigarette-smoking without inhaling is no more injurious than pipe or cigar smoking; (4) that the smoke of a cigar or pipe, if inhaled, is as injurious as cigarette-smoke inhaled; and (5) that the smoke from a Turkish pipe, if inhaled, is as injurious as that of a cigarette inhaled.

ELECTRICAL SCIENCE.

Electric Lighting in America.

THE following is an abstract of Prof. George Forbes's paper on the above subject, read at the recent meeting of the British Association. Professor Forbes has been in the United States, and has paid especial attention to the alternating-current system of electrical distribution. He first sketched the rapid advance of electric lighting in the United States as compared with its slow progress in England, — a result which he considered partly due to the acts of

Parliament regulating electric distribution in the latter country. The rapid progress in this country he ascribed partly to the fact that capitalists here have sufficient technical knowledge to cause them to take up and actively develop new scientific discoveries. Professor Forbes called attention to the fact that storage-batteries have not found favor in America, all of the lighting being done directly from the machines. The objection against depending on moving machinery entirely is the possibility of a break-down putting a district in darkness, but experience has shown this fear to be groundless. The Edison station in Pearl Street, New York, has only stopped once in seven years, and it has been working night and day.

The greater part of the author's paper was spent in describing the Westinghouse alternating-current system. At the end of last year this company had 153,285 incandescent lamps installed, fed from 152 stations: at present the number of lamps in use exceeds 300,000. The greatest trouble the Westinghouse people have had to encounter has been from the short-circuiting of their overhead mains from falling telegraph and telephone wires. This difficulty is overcome by subdividing their dynamo power and the circuits. Some of the stations are worked by natural gas, the fire under the boilers being automatically regulated so that one man can attend to a station of 1,000-horse power. At first the hydrogen in the gas attacks the iron of the boilers, but after a time the metal gets into a condition in which no further deterioration takes place. Instead of using a small number of large engines, it has been found economical to drive the dynamos from a number of comparatively small-power, high-speed engines. This subdivision has the additional advantage of guarding against a break-down. A commendable feature of practice in America is the adherence to a few types of dynamos and converters. This allows them to be made cheaply; and all of the parts are interchangeable, so any damage can be repaired quickly and with little cost. The following tables give particulars of the construction of converters and dynamos:—

Dynamos.

	I.	II.	III.
Number of lamps.....	650	1,300	2,600
Current.....	35	65	130
Armature resistance	0.76	0.37	.95
Field resistance.....	14.5	7.0	3.6
Pounds of wire in armature.....	17	30	60
Pounds of wire in field	420	—	—
Total weight.....	4,800	9,000	—
Volts.....	1,050	1,050	1,050
Revolutions per minute.....	1,600	1,000	1,000

Converters.

	1	2	4	6	8
Number of lights.....	5	10	20	30	40
B. and S. gauge, primary.....	25	22	19	17	16
B. and S. gauge, secondary.....	11	8	8	8	7
No. turns of primary	900	700	560	480	400
No. turns of secondary	45	35	28	24	20
Resistance of primary.....	48	21.9	9.9	7	5
Resistance of secondary.....	0.04	.043	0.0197	0.0176	0.0107
Pounds weight finished.....	50	60	95	—	160

Thickness of iron plate used in construction..... 0.006 in. to 0.0065 in.

Thickness of paper insulation..... 0.0025 in.

Number of plates in No. 8 converter..... 1,350

Great care is taken in the insulation of the dynamos and converters. The insulating materials used are mica, fibre, and a su-

perior kind of varnish made of copal varnish and linseed-oil. The period of alternation used is 8,000 complete alternations per minute, and the efficiency of transformers is very high, even when not fully loaded. Tests have been made showing an efficiency as high as ninety-five per cent at half-load. The transformers are fixed outside the houses, either against the walls or on posts. The total efficiency from the engine to the lamp is very high, and 600 watts of energy have been supplied to the consumer for every brake horse-power (746 watts) at the engine.

Electric Lamps for Mines.

There are very few applications of electricity in which England leads this country, but one of them is in portable batteries and lamps for mining-work. These are being rapidly and successfully introduced in the collieries of England and Wales; and the following are the details of the most successful of them, taken from a paper of Mr. Nicholas Watts, read before the British Association at its last meeting:—

The Swan Lamp.—Secondary battery: four cells grouped together in a block of gutta-percha, which is enclosed in a wooden case. Luminosity, 1 to 1½ candles for ten hours' duration; weight, 7 pounds; price, \$6.25; cost of maintenance, 7 cents per week. In extensive use in South Wales.

The Schanschieff Lamp.—Single-fluid primary battery: four zinc-carbon cells in a solution of basic sulphate of mercury, about 36 per cent of the salt being in solution. The solution is sold at \$1 per gallon, and 89 cents is allowed for the same quantity of spent liquid with its solid residue and free mercury precipitated by the cells. Luminosity (with reflector), 2 to 3 candles for nine hours' duration; weight, about 5 pounds; price, \$7.50; cost of maintenance, 7½ cents per week. Tested at Cannock Chase, Mardy, Merthyr, and elsewhere.

The Pitkin Lamp.—Secondary battery: four cells. Luminosity (with reflector), 4 to 5 candles for ten hours' duration. The lamp is fitted with a switch and resistance to regulate the electro-motive force. Weight, 8 pounds; price, \$10.50. Used at Llwynypia, Ocean Colliery, Trevicky, and elsewhere.

The Walker Lamp.—Primary battery: three carbon-zinc cells in a strong brass cylinder attached to an outer case of brass or copper. The fluid is a mixture of bichromate of potash, nitric acid, and sulphuric acid. Luminosity (with reflector), sufficient to enable newspaper-print to be read at a distance of 12 feet; duration, ten hours; weight, 7 pounds; price, \$8; cost of maintenance, 14 cents per week.

The Portable Electric Syndicate Lamp.—Secondary battery. Luminosity (without reflector), 1½ candles for 1½ hours' duration; weight, 4½ pounds; price, \$5. The lamp is fitted with an automatic arrangement, whereby, if an outer casing of toughened glass be broken, the current is cut off to prevent explosion of fire-damp.

The Vaughton Lamp.—Secondary battery. The plates are wedged tightly in the cell, making the battery so compact that it may be subjected to much rough usage without injury. Weight, 5 pounds; working cost, 14 cents per week; price, \$6 to \$7.

The advantages of these lamps are, that they do not consume or vitiate the air, they give a steady and more powerful light than the ordinary miner's lamp, and the danger of igniting fire-damp is reduced to a minimum. With the rapid improvements in secondary and primary batteries, they will soon come into universal use.

ELECTRIC ABSORPTION IN DIELECTRICS.—A. Wullner, in *Wiedemann's Annalen* (xxxiii. p. 19), has studied the effect of time on the potential of a charged condenser. It is well known, that, when the specific inductive capacity of a substance is obtained by determining the capacity of a condenser of which it forms the dielectric, different values are found, according to the time that elapses between the charge and the measurement. Wullner has attempted to find some law that governs this 'absorption' of electricity by the dielectric. His method of experiment consisted in observing, by means of an electrometer, the variations of potential of a condenser which has received a determinate charge; the first readings being taken at intervals of twenty seconds, the rest at intervals of from one to two minutes. He experimented on a glass Leyden jar, and on disks of glass, ebonite, gum-lac, paraffine, sulphur, and mica. The results are, that the potential cor-

responding to a determinate charge diminishes rapidly during the first few seconds, and then varies almost as the terms of a feebly convergent geometrical progression. The law of variation varies with the substance, and is not always the same for disks of the same substance. The values of the specific inductive capacity obtained after as short a charge as possible are different for substances which are apparently identical, but are always sensibly the same disk.

BOOK-REVIEWS.

The Law of Equivalents in its Relation to Political and Social Ethics. By EDWARD PAYSON. Boston and New York, Houghton, Mifflin, & Co. 12°. \$2.

THE title of this book is forbidding, and as inappropriate as it is forbidding. The author's 'Law of Equivalents,' which he announces in such a formal manner, is nothing but the familiar truth that if we wish to attain any end, no matter what, we must use the means appropriate to that end; and that if we use the wrong means, we shall not attain the end, even with the greatest exertions. The truth is one of great practical importance; but its announcement in such a form, and as if it was a new discovery, is not fitted to attract the reader. The author's style, too, though generally clear, is too dithyrambic for a philosophical work, passages like the following being not infrequent: "Family—the very word itself is redolent of sweetness. It is a holy, yea, a wholly divine word. It fairly outtops every other word in the language. It is not so much an apothegm as a treatise, not so much a treatise as a text, not so much a text as a sermon, not so much a sermon as a poem," with much more of the same sort. The defects of style are aggravated by the too frequent use of interrogative sentences where declaratory ones would be more appropriate. But when these deductions are made, there is much in the book that is good, and may prove useful. Mr. Payson's special concern is moral improvement; and he insists that men are prone, and Americans especially so, to use the wrong means for this purpose; as, for instance, when they try to make men good by legislation, or to make them learned by simply establishing libraries and schoolhouses. In such cases, he says, we do not offer nature the right equivalent, we do not use the right means to reach the desired end. He rightly insists, also, on the importance of time as a condition of moral and intellectual improvement, reminding us that such improvement must necessarily be slow, and that changes in the beliefs and practices of a nation can only take place when the progress of events has prepared the way. He finds in the American people a tendency to look for some great spiritual movement as wonderful in its way as the great material advance of the past hundred years, and resulting in the regeneration of society; and he maintains that such expectations are unwarranted. Mr. Payson's views are in the main in accord with those of most judicious thinkers; but his work would have been more interesting and more useful if it had been written in a soberer and more philosophical style.

Lectures on Geography. By Lieut.-Gen. R. STRACHEY. London and New York, Macmillan. 12°. \$1.25.

THE University of Cambridge, about a year ago, accepted the proposal of the Royal Geographical Society to provide a lecturer on geography with the aid of funds to be supplied by that society. As an introduction to the lectures on this science, new to the Cambridge University, the council of the society was requested to arrange a course of lectures illustrative of the general character and scope of the instruction in geography suitable for a university course. In compliance with this request, a course of four lectures was delivered by Gen. R. Strachey, president of the Royal Geographical Society, which have now been published in the form of a book. Strachey designates as the aim of geographical science, to investigate and delineate the various features of the earth; to study the distribution of land and sea, the configuration and relief of the surface, position on the globe, and so forth,—facts which determine the existing conditions of various parts of the earth, or which indicate former conditions; and to ascertain the relations that exist between those features and all that is observed on the earth. On account of this point of view, the book is especially valuable. Since the importance of physical geography has become recognized, the

tendency has been to underestimate the value of topography, in the same way in which systematic botany and zoölogy became neglected when biology became the favorite study. Strachey first discusses the astronomical relations of the earth, its form and magnitude, and the history of its measurement. Appended to this is a chapter on map-making, in which he dwells upon Tissot's projections, the principles of which are unfortunately not yet sufficiently known either in England or in America. After a brief historical sketch of the development of our geographical knowledge, he passes to a brief review of physical geography and to considering the relations of vegetable and animal life to terrestrial features. He concludes with some remarks on the influence of geographical conditions on man. The book is clearly written, and we hope it will be widely read, as the author, by his terse and interesting treatment of the subject, impresses the reader with the importance of disseminating and promoting the science of geography.

Les Formes du Terrain. By G. DE LA NOË. Paris, Imprimerie Nationale. 4°.

LIEUT.-COL. D. DE LA NOË, of the geographical service of the French army, has prepared, with the collaboration of M. Emm. de Margerie, an elaborate treatise on the forms of the ground. It is of both geological and geographical interest. Under the first heading we should place the argument for the derivation of land-relief by sub-aerial denudation, the evidence for the origin of valleys by stream-erosion essentially independent of fractures, and other discussion of processes; under the latter heading we should include the description of plateaus, valleys, and other topographic elements, in connection with the conditions of their origin and development. The deductive considerations are fully supplemented with illustrations in a large volume of plates, many of which are reproductions of excellent topographic maps, chiefly of French localities. The relation of the activity of streams to their controlling base-level receives much more explicit attention than is common with European authors, and the sections in which this large problem is discussed are very profitable reading. The same may be said of the explanation of cross-valleys such as occur in the Jura Mountains. They are shown to traverse the anticlinal ridges where the structural arch, if complete, would be lowest. The list of authors quoted is remarkably full, and American writers receive a large share of notice.

Leibniz's New Essays concerning the Human Understanding. By JOHN DEWEY. Chicago, S. C. Griggs & Co. 16°. \$1.25.

THIS work is the latest issue in the series of 'German Philosophical Classics for English Readers,' now publishing under the editorship of Prof. G. S. Morris. The plan of the series does not contemplate the complete exposition of any philosopher's views, but only of some one of his masterpieces. This plan has some advantages, but also some disadvantages; and these latter are specially prominent in the case of Leibniz, whose mental activity was so multifarious. He was by no means a mere philosopher, and even in philosophy the 'New Essays' present but a small portion of his views. Professor Dewey has seen this, and endeavors, so far as his space permits, to remedy it. He remarks that "Leibniz, like every great man, absorbed into himself the various thoughts of his time, and in absorbing transformed them. He brought into a focus of brilliancy the diffused lights of truth shining here and there. He summed up in a pregnant and comprehensive category the scattered principles of his age." Some of us will regard this encomium as a little extravagant, yet, at all events, it shows what Leibniz attempted to do, and hence Professor Dewey has found it necessary to enlarge his plan a little, and give some account of those doctrines of his author not presented in the 'New Essays.' He has, we think, given too much attention to the theories of monads, and pre-established harmony, which are products of imagination rather than of reason; while, on the other hand, he has taken no notice of Leibniz's attempt to reconcile Infinite Goodness with the existence of evil. In dealing with the 'New Essays' themselves, which were written in reply to Locke, Professor Dewey has to present the views of both philosophers to a considerable extent; and in doing so he clearly reveals his own philosophical standpoint. He is a disciple of Kant and Hegel, and looks upon Leibniz as their forerunner, while Locke's work is in his eyes little

better than a tissue of falsehood. Some of us who have a higher opinion of Locke may think that Professor Dewey has not always presented the English philosopher's views correctly, though we are sure he has not done him any intentional injustice. He shows, too, a strong desire to connect the views of Leibniz with his own, and, in trying to do this, sometimes gives an interpretation that seems a little strained. But, if due allowance is made for the author's philosophical standpoint, the reader will obtain from this book a pretty good idea of most of Leibniz's doctrines in their relation to those of Locke on the one hand, and of the later German thinkers on the other. This series of expositions will, we think, be very useful in giving to purely English readers a more intimate acquaintance with the products of German thought.

First French Course. By C. A. CHARDENAL. Boston, Allyn & Bacon. 16°.

AFTER a brief introduction on the phonetics of French, the author proceeds at once to give a systematic series of exercises on the elements and syntax of the language, keeping throughout in view the practical end to teach the pupil thoroughly the use of the French language. The French-English and English-French exercises are well selected, and the lessons so arranged that the most general and most fundamental laws of the French language are given first, after which details are taught. In an appendix a tabulated review of forms and rules is given, and the book concludes with a brief series of extracts, to which a vocabulary is added.

Teachers' Manual Series. Nos. 7, 8, 9, 10. New York and Chicago, E. L. Kellogg & Co. 15 cents each.

THE last four numbers of this series, which have recently been issued, contain material that will prove very suggestive to teachers. No. 7 is a reprint of Bishop Huntington's memorable address on 'Unconscious Teaching,' that was delivered many years ago, and at that time excited great interest. He justly emphasizes the fact that the teacher's character and behavior influence in a great degree the development of the pupil, and that the most careful attention should be paid to this fact. No. 8, written by James L. Hughes, is entitled 'How to keep Order;' and in this the author endeavors to show that keeping order is a necessary means of training the character of the pupil, as order teaches that conscious deviation from the right, and that conscious violation of any rule, is a wrong, no matter how important or unimportant the rule be. The latter half of the book is occupied by a discussion of mistakes of the teacher which promote disorder, and thus the best instruction as to how to keep order is given. In No. 9, by Rev. R. H. Quick, 'How to train the Memory,' the author gives the results of his experience, which are, that attention, arrangement, and association are the proper means of training the memory. No. 10 is a description of 'Froebel's Kindergarten Gifts,' by H. Hoffmann. These gifts are well known, and the author sets forth very clearly the best methods of using them for training the child's senses and power of observation.

Francis Bacon. By JOHN NICHOL. Part I. Bacon's Life. Philadelphia, Lippincott. 16°. \$1.25.

THE present sketch of Bacon's life belongs to the series of Philosophical Classics, edited by William Knight. The author has endeavored to record impartially the events which led so many writers to condemn the character of Bacon. He accepts neither the views held by Spedding, who is bent on believing the best, nor those of Abbott, who does not find any thing to commend in Bacon's career. His views agree with those propounded by Gardiner. The author rightly emphasizes the necessity of carefully considering the circumstances of the age in which Bacon lived, in forming an opinion of his actions. He dwells upon the fact that during his life he took the unpopular side of several questions, and thus proves that he was not so mean as to sacrifice every thing to the promotion of his own interest. The author's treatment of the trial of Essex is of special interest, and we think he has well succeeded in explaining how Bacon came to take a prominent part in those events, and that his actions were in accordance with views expressed in his letters to Essex. On the other hand, the author does not try to excuse his great faults and weaknesses. In a clear introduction, Bacon's age and surroundings are described, and next his life until the death of

Elizabeth is treated. His relation to James, his gradual rise and sudden downfall, form the following chapters of the book, which concludes with a sketch of his last years. The second volume will contain a *résumé* of his philosophy.

How to teach Manners in the School-room. By Mrs. JULIA M. DEWEY. (The Reading Circle Library, No. 7.) New York and Chicago, E. L. Kellogg & Co. 16°.

WE fully agree with the authoress of the present little volume, that the teacher ought to be careful to teach the pupils good manners, but we disagree in every other respect with her views. It seems that her prime object in teaching good manners is to make children contemplate in all their actions, "What will people say if they see me doing this or that?"—a principle that can hardly be considered as improving the moral standard of the pupils who are subjected to it. It is true, as the authoress says in the introduction, that true courtesy implies strict honor, self-possession, forbearance, and refined feeling; but these qualities will hardly be developed by such teaching as forms the greater part of Mrs. Dewey's suggestions. We cannot agree with principles similar to the following, which has been taken at random from the book (p. 55): "Why should our behavior on the street be good? Because many people see us there, and notice if it is not good."

A Quiz Manual of the Theory and Practice of Teaching. By ALBERT P. SOUTHWICK. New York and Chicago, E. L. Kellogg & Co. 16°.

IN a long series of questions the author places before the teacher many important problems regarding the method of teaching. The first part of the book contains questions, while the second contains answers to these questions. The subject is divided into numerous divisions, according to the subject of teaching; and a study of the work will prove a valuable incentive to improving the methods applied in teaching, as it suggests many ideas to the teacher, a great number of which he will accept, and use for the benefit of his pupils. In a general introduction the author treats of the general theory of education. This is followed by notes on the theory of teaching reading, arithmetic, natural history, language and grammar, composition, rhetoric, etymology, literature, and so on through the whole range of subjects taught in our schools. As an appendix, some notes on manual training are given.

NOTES AND NEWS.

THE editor and publisher of the *International Ethnographical Archive* have issued, on the occasion of the Seventh International Congress of Americanists, a supplement to their journal, entitled 'Contributions to the Ethnology of America.' This interesting pamphlet contains extracts from the journal, and one of the beautiful plates that are to accompany Stoll's account of the ethnology of Guatemala. The pamphlet contains one American and four German contributions. The journal continues to be one of the most magnificent scientific periodicals, and it bids fair to become one of the principal sources of information for the study of ethnology, more particularly for that of human inventions.

— At a meeting of the council of the Anthropological Society of Washington it was voted to continue the publication of the quarterly journal, *The American Anthropologist*. This journal publishes in full the most important papers read at the meetings of the society.

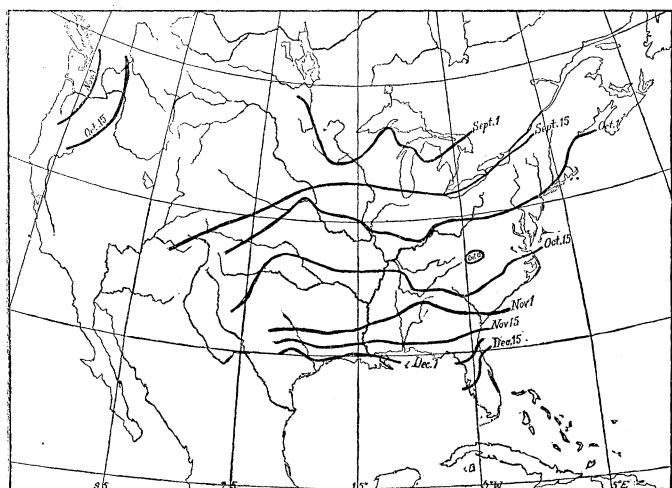
— In the publication in *Science* a few weeks ago (xii. No. 295) of the classification of soils, which formed a part of the annual report of Major Powell, director of the United States Geological Survey, one class was inadvertently omitted,—that of the playa soils; i.e., those formed by the wash of rains and the evaporation of intermittent bodies of water that have no overflow.

— The trustees of the Hoagland Laboratory, Brooklyn, announce the completion of the laboratory, and its equipment for work. Special facilities are offered to those who desire to prosecute original research. For this purpose private laboratories have been provided, and arrangements are now being made for the purchase of a library which shall contain all the literature necessary for reference in the departments of bacteriology, physiology, and pathology.

Owing to the absence in the South of Dr. George M. Sternberg, the director, in the further prosecution of his investigations into the cause of yellow-fever under orders from the President of the United States, the course of lectures on bacteriology, already announced, will be postponed until his return. The trustees further announce that the services of George T. Kemp, Ph.D., Johns Hopkins University, have been obtained as associate in bacteriology and physiology, and that with his assistance, and under the direction of Dr. Sternberg, practical instruction in bacteriology will be given during the winter and spring.

— Capt. C. E. Dutton has been placed in charge of the hydrographic work of the investigation of the problem of reclaiming the arid lands of the West. He will divide the territory into districts, but work will be done in only a few of them under the present appropriation. Those selected in which to begin are the basins of the South Platte, Arkansas, Colorado, Gila, and Humboldt Rivers. The parties will be sent into the field immediately.

— The *Monthly Weather Review* for July contains an interesting map showing the average date of first killing frost in the United States. A reduction of the map has been reproduced here. The chart has been prepared solely from observations made at voluntary observers' stations. The data from the regular signal-service stations were not incorporated, because it is believed that observations as to the occurrence of frost are made in the country with greater opportunities for accuracy as to earliest date and extent of damage



than in large cities, where signal-service stations are generally located. In the preparation of the chart, diligent effort has been made to secure reliable information as to killing frosts only, especially those frosts which were injurious to vegetables and other crops. It is probable that in some cases the first frost reported may have been 'light' instead of 'killing.' It was found that killing frost occurred throughout the year along the northern boundary of the United States north of Dakota and Minnesota. In California killing frosts are very unusual in the extreme east and north-east portions: throughout the western portion of the State, light frosts in winter, appearing about the middle of December and continuing not later than February, are not unusual, but rarely injure even delicate plants. The observations from which deductions have been made vary in length of records from two to forty-nine years, thirty-six stations having records of fifteen years or more. The total number of stations involved in the work is four hundred and thirty-two. It appears from the tabulated statement that the average error of the earliest date will be about eighteen days. This necessitates the continuation of the observations over a very long period in order to reach a probable error not exceeding a few days, and it may therefore be assumed that a final construction will show the lines to run somewhat differently from those represented here. The collation and discussion of these observations are of great importance to the farmer.

— The Western Society of Naturalists will hold its first annual meeting in the buildings of the Illinois State University at Cham-

paign, Ill., Wednesday and Thursday, Oct. 24 and 25, 1888. The president of the society, Dr. Stephen A. Forbes, will deliver the presidential address on Wednesday evening. Discussions on the methods of teaching natural history will form one of the principal features of the programme of the meeting. Prof. J. S. Kingsley of Bloomington, Ind., is secretary of the society.

— In the 'Report of the Kentucky Geological Survey for 1888,' Dr. A. H. Loughbridge gives a full account of the geological and economic features of the Jackson Purchase Region. After a description of the topography and geology, the author discusses minerals and water-supply very fully, and gives detailed statements of the agricultural resources. This part of the book is of special value; and the author's descriptions of the physiognomy of the uplands and lowlands, and their respective vegetation, is of great practical and scientific interest. In a short chapter some of the most interesting antiquities of this region are described. The second part of the volume contains descriptions of the countries forming the Jackson Purchase. The results of a deep boring at Paducah are very important, as they prove the existence of a great fault in the paleozoic strata of that region. The volume is accompanied by three good maps, showing the geology and elevations, the agricultural features, and deposition of gravel-beds. The topographic maps of Kentucky made by the Geological Survey under the direction of J. R. Hoeing are among the best made by any of the State surveys.

— D. Charnay, during his recent journeys in Central America, explored a certain group of ruins which he claims to have discovered, and which he named 'Lorillard City.' According to a communication of Dr. G. Brühl, these ruins were discovered in 1881 by Professor Rockstroh, who requested Maudslay to make a survey. According to Rockstroh, their proper name is 'Menché tenamit,' the city of Menché, the latter word being the name of a chief.

— The long series of systematical meteorological observations made in Bavaria have yielded many important results. Recently C. Lang has examined the records of the variations of underground water in their relation to precipitation, and to fires caused by lightning in the 'German Meteorological Annual for 1887.' He finds that the height of the water found under ground varies according to the amount of precipitation. This influence is somewhat obscured by the fact that the increase corresponding to a certain increase of precipitation is greater in the spring and autumn than it is in summer. It is generally assumed that the danger of damage done by lightning has steadily increased, but Lang shows that this view is not correct. When he plotted the number of recorded fires caused by lightning, together with that of the variation of underground water, he found that the maximum of one curve exactly coincided with the minimum of the other. This fact is easily explained. Damp ground is a good conductor, and facilitates the gradual discharge of electricity, while dry soil favors sudden, violent discharges. Therefore during periods of increasing underground water danger of accidents caused by lightning decreases.

— In *The American Magazine* for October, Dr. William F. Hutchinson furnishes another of his charming South American papers, describing in this issue the Orinoco River; Helen Strong Thompson contributes an illustrated paper on the 'Sacred Quarry in the Great Red Pipestone Country;' and Florence A. Davidson has an illustrated paper on 'Pioneer District Schools.' In addition to the literary features, are a series of papers on practical questions of the day: a few of the many legitimate ways in which 'the surplus' can be utilized are shown by M. W. Hazen; Mr. Hazen makes a plea for a national training-school; Mr. M. M. Estee has a paper showing the effect of free trade on Pacific coast industries; Mrs. J. Ellen Foster, chairman of the Women's National Republican Committee, argues that "prohibition is not a national issue;" and Mr. Enoch Ensley of Tennessee gives 'A Southerner's National View of Protection.'—Roberts Brothers have just ready in their Famous Women Series 'Elizabeth Barrett Browning,' by John H. Ingram, which is the first biography published of this author. —Professor Bryce's book on the United States, which he hopes to have ready in November, the London correspondent of the *New York Times* thinks, "will probably rank high among the most im-

portant studies of the American Republic by foreign hands. It examines very carefully our whole governmental structure, Federal and State, and the social economy and political foundations on which the edifice rests."—*The Kindergarten*, Chicago, is fulfilling its claims to give to mothers of young children methods of amusement combined with instruction. 'Nursery Occupations' and 'Typical Lessons,' in the October issue, give practical hints that alone would pay the price of subscription.—*The English Illustrated Magazine*, published by Macmillan & Co., is to be enlarged to seventy pages, the price remaining the same (15 cents).—Edward Meeks, Philadelphia, has in preparation a second edition of Roper's 'Handbook of Modern Steam Fire-Engines.'—'Gardner's School Buildings' (E. L. Kellogg & Co., 25 Clinton Place, New York) will be out this week; also (by same publishers) No. 11 of Teacher's Manual Series, entitled 'The Argument for Manual Training,' by Dr. Nicholas Murray Butler.—In the *Overland Monthly* for October is a paper on fog and fog-signals on the coast, by Mr. F. L. Clarke, who developed some facts of importance to seafarers on 'areas of inaudibility' of signals.—The *New York World* has in preparation 'The World Almanac for 1889.'

LETTERS TO THE EDITOR.

Kiessling's Twilight Phenomena.¹

SIMULTANEOUSLY with the publication of the 'Royal Society's Report upon the Krakatoa Disaster and its Results,' comes the most important German contribution to that section of the subject treating of the abnormal glows,—a subject which occupies two-thirds of the 'Royal Society Report,' of nearly five hundred pages. The bulk of the contained matter is nearly equal in the two books; but it is drawn from such diverse sources, and the views propounded in the theoretical parts are so different, that only a small proportion of the whole appears in duplicate. The beautiful colored plates in each curiously support the main theory of the book, their fidelity to nature indicating the probability that the diffractive effects advocated by Professor Kiessling and the reflection upheld by the 'Royal Society Report,' each have a share in the final result.

The historical introduction deals with the study of twilight phenomena: Von Bezold's admirable summary (the work is dedicated to the distinguished director of the Berlin Royal Meteorological Institute) is given in detail. The work is then divided into two parts, four sections treating mainly of observations, and two of experiment and conclusions.

Section I. gives a detailed list of glows in forty-four years, noting any coincidences with earthquakes and eruptions. The three opening dates are 989, 1117, and 1554. There are at least seven earthquake coincidences, the associated glows being strictly local. The 'Royal Society Report's' list is of the one hundred and fifty-five chief volcanic eruptions since 1500, and glows (thirty-one in all), in parallel columns. Thirty of the latter coincide with eruption years, which number is increased nearly one-half by Kiessling's tables. Most worthy of notice is the remarkable completeness of detail concerning the European glows after the eruption of Graham's Island, near Sicily, which was also submarine.

Section II. largely occupies the ground of the 'Royal Society Report,' Part IV. Sect. II., both being lists of special appearances since Aug. 26, 1888, approaching nine hundred each in number. The former, however, continue on to the close in 1886, while the latter are chiefly confined to 1883. The immense amount of valuable records obtained from the ships' logs of the two countries is very striking. It will be a great pity if similar work is not performed in connection with the merchant marine of North America. The North American land-returns have been copiously drawn upon, especially by Professor Kiessling, thanks to the *Monthly Weather Review*; but here, again, there must be a rich store of private records awaiting collation.

Four excellent maps, for Aug. 26 to Sept. 30, for October, November, and December, 1883, contain localities, with dates, for the glows, by which their progress can be easily traced. With the same object in view, the records in the list, up to the close of No-

vember, are arranged in four parallel columns, according to longitude.

Professor Kiessling throughout treats the bright 'glory' round the sun, known as 'Bishop's ring,' as the most important phase of the glows. Section III. describes its appearance, spread, and changes, the explanation forming an important portion of the second part. His already published and generally accepted explanation of it by diffraction is there supported by a most interesting series of experiments. The equally unique appearance of the counter-bow, at the point opposite the sun directly after sunset, he thinks is to be regarded as of similar origin. This was noted in Europe almost simultaneously with the glows: on Nov. 27, 1883, and Dec. 15 and 20, at Sunderland, by Mr. T. W. Backhouse; Dec. 22, 1883 (not 1884 as misprinted in 'Warner's Prize Essays,' p. 40), by L. Richardson at Newcastle; on Dec. 29 to Jan. 3, by Herr Jesse, Steglitz; and on Jan. 12, 1884, by the writer. Measurements by the first and last prove identical with those of Bishop's ring. As most people chiefly regard the rising or setting sun, the anti-solar phases escape observation. Hence all observations of the counter-bow would specially repay collation.

In Section IV. Professor Kiessling, dealing with the outspread of the glows, shows that the originating cloud-haze must have consisted at first of distinct streams, the probable courses of some of which he indicates. The velocities of outflow he fixes at between sixty-seven and eighty-nine miles per hour, as against seventy to eighty-four, the extreme values deduced in the 'Royal Society Report.' Both conclude that the height, for Europe, was about twelve miles.

The artificial formation by diffraction in dust, condensed vapors, etc., forms the subject of Section V., which opens the second part, and his simple but effective experiments deserve wide repetition and development. Incidentally capital illustrations are given of cloud-formation. His previous publications upon this subject are considerably expanded, and fresh applications made. As already stated, they form the main basis of his contention for diffraction as the paramount cause of all the phases of the glows, admitting, however, reflection as a subsidiary agent. His method of treating the glow-colors concentric to the sun apart from the glow-colors parallel to the horizon, upon which, during the twilight, the former are superposed, greatly simplifies their elucidation. Probably his arguments as regards the former class will be regarded as the more convincing, especially as diffraction so obviously explains Bishop's ring. As to the horizontal layers, no doubt diffraction plays a considerable part, but as certainly Messrs. Russell and Archibald, in the 'Royal Society Report,' rightly uphold reflection as the main factor. In this they are supported by Professor Ricco. Of the various objections brought forward by the latter, two may be noted. Professor Kiessling accepts the interposition of clouds or mountain-peaks as the cause of the dark bars often dividing the first glow; but this could hardly apply if the main light is due to diffraction. Again: with the others he considers the second glow to be a reflection by the haze-layer of the first. Such a surface, then, would surely reflect direct sunlight as well.

To some of the objections, however, the present work indicates Professor Kiessling's probable reply; as, the possibility of the dust-haze so quickly assuming the homogeneity required by his theory, and the occasional appearance of day and twilight glows independently. We may also notice that he ascribes the haze-cloud chiefly to condensation products, while the 'Royal Society Report' favors mirror-like surfaces from microscopic pumiceous bubbles,—conditions in each case in harmony with the adopted theory. The discussion of tropical sunsets at Loango and in South America provides Professor Kiessling with several strong points, for in these instances he is able to show a remarkable agreement between observation and experiment. The excellent colored sketches by Dr. Pechmel-Loesche are here a material assistance.

The general arrangement of this valuable work is well adapted for reference. Only one misprint of any moment has been noted: on p. 55, § 44, "110°O" should apparently be "120°O," or the "Middle Dog" Lighthouse lies some distance inland in China. The printing is most exquisitely clear, which is no small boon, for the title is not the only word, which, to eyes accustomed chiefly to English words, are almost appallingly long.

J. EDMUND CLARK.

¹ Untersuchungen über Dämmerungserscheinungen, zur Erklärung der nach dem Krakatau-ausbruch beobachteten atmosphärisch-optischen Störung, von J. Kiessling. Hamburg und Leipzig, Leopold Voss, 1888.

Sorting Colored Wools when Blindfolded.

YOUR reviewer considers that the experiments of Professor Fontan, in which an hypnotic subject sorted colored wools with his fingers when his eyes were completely covered, are simply incredible. It is true that they are so hard to believe in, that a single instance can produce scarcely any effect at all; but they cannot be considered as absolutely incredible, in view of the fact that Prof. Vitus Graber has shown that so thick-skinned an animal as the cockroach re-acts to colors when his antennæ have been removed and his head has been covered with a thick coating of black sealing-wax.

M.

Classification of Soils.

IN the highly interesting summary of the forthcoming report of Director Powell, given in the issue of *Science* of Sept. 28, it is stated that in this report is announced a "new, scientific, and systematic classification of soils," a summary of which is then given.

Your correspondent is evidently unfamiliar with the standard and current literature of the subject. Director Powell simply adopts, for the purposes of geological field-work, a "working classification of soils," based upon their geological genesis. It is scientific and systematic, but certainly not new to any of those who have been concerned in such work, or have mapped its results from the standpoint of the geologist. Major Powell substitutes, perhaps wisely, the terms 'endogenous' and 'exogenous' for the more familiar ones of 'sedentary' and 'transported;' and instead of classing lacustrine and marine soils under 'alluvial' as a general head, he restricts the term 'alluvial' to those soils formed by *running* water only. I doubt the advisability of the latter change, unless we cease also to speak of lacustrine and marine alluvium, using some other term for the general idea of genesis by recent alluvion.

Major Powell also apparently proposes to replace the old term 'colluvial' by that of 'overplacement' soils. I doubt that even from the geological standpoint this is an improvement, for within this class must be placed the larger portion of the arable soils of hill-lands (there being no other within which they can regularly fall); and these certainly result more properly from 'colluvion'—i.e., a 'washing-together' and intermixture of the various materials on the slopes—than from what may properly be termed 'overplacement.'

As a schedule stated by himself to be merely tentative and for the purposes of field-work, and published only in an abstract made by a third party, Major Powell's classification is not yet a proper subject for extended comment. But it cannot but be a matter of congratulation that the subject of soils is now to receive close attention in the field-work of the survey, and will doubtless thereafter be subjected to such further elaboration as may be necessary to render the results available for agricultural practice.

E. W. HILGARD.

Berkeley, Cal., Oct. 5.

Recent Information from the Muir Glacier, Alaska.

IN my paper upon the Muir glacier, published in the *American Journal of Science* for January, 1887, I gave on pp. 11-12 a summary of the reasons for believing that the front of the glacier was retreating at a pretty rapid rate. Recent information confirms this view in a striking manner. I learn through Captain Hunter that upon June 27 last he established an observation station upon the glacier, and took accurate notes and measurements both then and in his recent trip in September, and found that during the three months of absence the glacier had broken off, and receded inland one-fourth of a mile. Whether this distance is regained by the forward motion in the winter or not, remains to be seen. Doubtless the captain can determine this when he returns next summer. According to my own observations during my prolonged visit in 1886, the central point of the glacier, where it meets the water of the inlet, remained nearly stationary, although great masses were repeatedly seen to break off from it, and sometimes it seemed during an interval of a few days to have receded perceptibly, while at other intervals it had regained its position. But from Captain Hunter's observations this season, it would seem that the waste consequent upon the formation of icebergs is greater than is supplied even

by the rapid motion of the glacier (from sixty-five to seventy-two feet per day), demonstrated by my observations to have existed a mile or two back from the front. Captain Hunter also reports that immediately in front of the ice his sounding-line ran out one hundred and six fathoms without reaching bottom; and, since the ice rises about four hundred feet above the water, there must here be a depth of more than a thousand feet of ice.

G. FREDERICK WRIGHT.

Oberlin, O., Oct. 11.

Chalchihuitl: A Note on the Jadeite Discussion.

IN his very valuable and interesting note on jadeite in *Science* of Oct. 5, Dr. Brinton called attention to the fact that Bernardino Sahagun had mentioned *iztac chalchihuitl* as being white chalchihuitl, fine green, and quite transparent, and also says that the white chalchihuitl was obtained from quarries in the vicinity of Tecalco, which he (Dr. Brinton) believes to be the modern Tecali. If such is the case, it is very evident that this is the so-called Mexican onyx, 'Tecali marble or onyx,' as it is sometimes called, which exists there in veins, being in reality an aragonite stalagmite. Great quantities of it were made into Mexican figures, ornaments, and beads, which are found all the way from northern Mexico down to Oaxaca. This so-called onyx is extensively quarried to this day, forming one of our richest ornamental stones.

The definition of *quetzal chalchihuitl*—"precious chalchihuitl, white, with much transparency, and with a slight greenish tinge, something like a jasper"—is somewhat contradictory, if it was intended for jadeite. A variety of green stones exist at present, and were used in considerable abundance in ancient Mexico. Among eight green stone objects which have been recently sent me as jadeite, four are jadeite, one is a laminated serpentine, another is a greenish quartz, and the other two are a mixture of white felspar and green hornblende.

In a string of beads there are four pieces of jadeite; but all the others were, as are the jadeite beads, in the form of rounded pebbles, drilled from both sides, and there are nearly a dozen different substances in this string. The fact that these jadeite beads were strung in with the others, apparently without any order except that they were graded to taper toward each end, points very strongly to the conclusion that they were found with the other pebbles in a brook, and, being of the correct size, had been drilled the same as the others, although very much greater in hardness. The question is, are these pebbles a part of the tribute mentioned in the Codex Mendoza referred to by Dr. Brinton? If so, they must have existed in some abundance; and they have not been reworked from other objects, as are the larger pieces, like the Costa Rican celts. Can it be that the large ones came from lower Mexico, and, after being used as implements, were traded off, but being green stones, which have been given the preference the world over by savages and barbarians, were made into votive objects? Among other green stones used by the ancient Mexicans are green jasper, green plasma, serpentine, as well as a fine-grained green shale and this Tecali marble, often of such a rich green that at a glance it could be mistaken for jadeite.

Dr. Brinton's theory that Vilalta (Zoochila), in the State of Oaxaca, is the possible home of large pieces of jadeite, if it exists in Mexico, is a good one, since some of the largest jadeite ornaments known, including the great sixteen-pound votive adze, were believed to have come from that district, and it was from a quantity of pebbles from one of the streams of this region that the writer identified yellow and blue sapphire almost as pure as the Ceylonese, being one of the only materials with which jadeite can be worked.

Dr. Meyer is quite right when he calls the *Nephritfrage* at present a chemical problem; for the mineralogist, by analysis and with the microscope, can readily distinguish the many substances of one kind or another that are sold as and called jade even by the Chinese, among which are jadeite (*feitsui*, or imperial jade), jade or nephrite, green aventurine, green plasma, light-green jasper, green hornblende, serpentine, agalmatolite artificially stained green, and in one instance even green-and-white glass, which last material was presented as jade by a Chinese official to an American lady.

GEORGE F. KUNZ.

New York, Oct. 15.